FISH BIODIVERSITY IN THE WATER BODIES OF SAMASPUR BIRD SANCTUARY, UTTAR PRADESH: TOWARDS DEVELOPING A FRESHWATER AQUATIC SANCTUARY[1]

U.K. Sarkar[2,3], D. Kapoor[2], S.K. Paul[2], A.K. Pathak[2], V.S. Basheer[2], P.K. Deepak[2], S.M. Srivastava[2] and L.K. Tyagi[2]

[1]Accepted November 2005
[2]Endangered Fish Biology and Systematics Lab, National Bureau of Fish Genetic Resources, Canal Ring Road, Dilkusha, Lucknow 226 002, Uttar Pradesh, India.
[3]Email: usarkar1@rediffmail.com, uksarkar@nbfgr@res.in, nbfgr@sancharnet.in

Extensive surveys were conducted in Samaspur Bird Sanctuary (799.37 ha), Uttar Pradesh during June 2000 to December 2004, to explore the status of fish germplasm resources in the water bodies. A total of 3,444 fish were collected and classified into 7 orders, 19 families, 33 genera and 46 species. One exotic species (n=2) *Aristichthys nobilis* was collected. This is the first ichthyofaunal report of this Sanctuary. The dominant species was *Gudusia chapra* (relative abundance, 7.25%) and the subdominant species were *Labeo bata* (RA, 6.67%), *Salmostoma bacaila* (RA, 5.51%), *Amblypharyngodon mola* (RA, 5.08%), *Notopterus notopterus* (RA, 4.50%) and *Eutropiichthys vacha* (RA, 3.91%).
The analysis showed that 28.26% of fish species, which are reported to be threatened as per IUCN, had a stable population in the Sanctuary. Apart from the major Indian carps and the above-mentioned species, the important species recorded were *Chitala chitala*, *Chupisoma garua*, *Ailia coila*, *Aorichthys aor*, *Wallago attu*, *Labeo gonius*, *Labeo pangusia*, *Puntius sarana*, *Rhinomugil corsula*, *Channa marulius*, *Channa striatus*, *Ompok pabda* and *Ombok pabo*. The study confirms that protected freshwater areas are important for conservation of regional fish biodiversity, especially for local and endangered fish species.

Key words: Samaspur Bird Sanctuary, fish biodiversity, threatened fish, aquatic Sanctuary

INTRODUCTION

Protected areas could play an important role in the conservation of fresh water fishes in India, but first there is a need to identify the conservation value of these areas in relation to the biogeographical diversity of fishes, and the factors that have an impact on fish communities. The fish diversity of India is declining rapidly, due to urbanization, pollution, damming and diversion of waters for irrigation and power generation, which have, in the last few decades, subjected our natural water bodies in general, and rivers in particular, to severe stress. Provision of a secure habitat is important to protect the genetic resources of fresh water fish. In India, rivers, streams, wetlands and beels of existing protected areas offer good opportunities for creating fresh water aquatic sanctuaries. The current protected area network encompasses almost 4.66% (*c.* 153,000 sq. km) of India's geographical area in over 480 sanctuaries and 86 national parks (Rodgers *et al.* 2000). There are reports of illegal fishing within protected areas (Wakid and Biswas 2003). India is endowed with about 2,163 fish species, so far, as has been documented by the National Bureau of Fish Genetic Resources (Anon 2004), of which about 700 species inhabit fresh water. Jayaram (1999) has, however, reported 2,500 species with 930 freshwater inhabitants. A detailed inventory of fish and habitat parameters in the protected areas will indicate the present status of threatened freshwater fishes in these water bodies.

In the present study, a detailed survey was conducted in the water bodies of Samaspur Bird Sanctuary, Rae Bareilly to ascertain the present scenario of fish biodiversity within protected areas. This study is the first attempt to explore the fish diversity potential within Samaspur Bird Sanctuary.

STUDY AREA

Samaspur Bird Sanctuary is situated in Salon, Rae Bareilly district of Uttar Pradesh (Fig.1). It is spread over 799.37 ha and has lentic water bodies comprising of six small inter-connected lakes, with a water area of 305.46 ha. The lakes are perennial and the main water sources are the various tail ends of canals, which are connected to these lakes. During flooding these lakes drain into villages adjacent to these lakes.

MATERIAL AND METHODS

Monthly sampling was carried out using stratified random methods. The total water body was divided into three sampling zones. Positional coordinates of the sampling points of the water bodies were, 25° 59.55' N, 81° 23.32' E and 25° 59.92' N, 81° 23.51' E, mean altitude 98.37 m above msl. The fish sampling was done in many points covering all representative habitat of the Sanctuary. Various mesh size of gill nets, cast nets and dragnets were used for sampling. Colour spots, if any, maximum size and other characters of the fishes

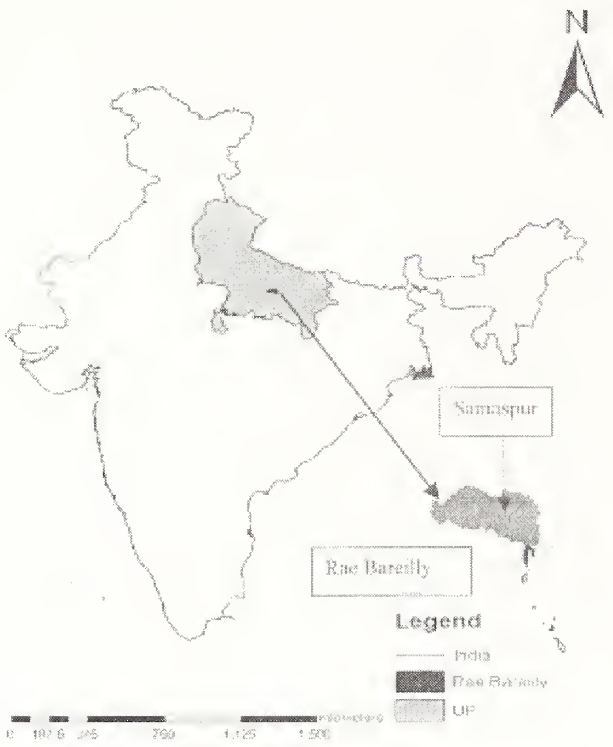

Fig. 1: Map of India showing the location of the Sanctuary

caught were recorded and the samples were preserved in 10% formalin solution. Talwar and Jhingran (1991) and Srivastava (1988) were followed for fish identification. References to conservation status categories within this paper are based on IUCN classification as per CAMP-NBFGR (1998).

RESULTS AND DISCUSSIONS

The present study indicates that water bodies within Samaspur Bird Sanctuary have a rich biodiversity of freshwater fish. A total number of 46 species from 7 orders, 19 families, and 33 genera were documented during the study period. Cyprinids were the dominant group (38.4%), followed by Perciformes (23.07%) and Siluroids (15.38%). Chinese big head carp *Aristichthys nobilis* (n=2) was recorded on one occasion, probably an escapee from culture system to natural waters. The forty-six species documented are listed in Table 1 along with their conservation status, local name and size distribution. The dominant species was *Gudusia chapra* (RA, 7.25%), and the subdominant species were *Labeo bata* (RA, 6.67%), *Salmostoma bacaila* (RA, 5.51%), *Amblypharyngodon mola* (RA, 5.08%), *Notopterus notopterus* (RA, 4.50%) and *Eutropiichthys vacha* (3.91%). An important observation was that 28.26% of fishes that come under the threatened category in other areas were stable in the Sanctuary waters. This was recorded during experimental sampling of the waterbodies throughout the study period (2000-2004).

In India, efforts have been made recently in bringing together the studies of fish diversity in various rivers with regard to freshwater habitat. However, fish diversity of many water bodies within protected area network is not yet investigated and the information related to species diversity, conservation status of many species is unknown. Review of literature indicates that few reports on fish diversity within protected water bodies are available. Arunachalam and Sankaranarayanan (1999) published a list of 31 species of fishes from streams in Gadana river basin located in the buffer zone of Kalakkad Mundanthurai Tiger Reserve of Western Ghats, of which 4 species were reported to be first records by the authors from Gadana river. Biju *et al.* (1999) described 40 freshwater fish species from Prambikulam Wildlife Sanctuary Palakkad district, Kerala. *Labeo calbasu*, *Puntius sarana*, *Puntius ticto*, *Chanda ranga* and *Mastacembelus armatus* were reported by Arunachalam and Sankaranarayanan (1999) from Gadana river in Kalakkad Mundanthurai Tiger Reserve. Sarkar *et al.* (2002) described a record size (22.5 cm TL) of *Gudusia chapra* from the waterbodies of Samaspur Bird Sanctuary. Interestingly, the average total length of many of the fishes sampled was larger than fishes available outside the Sanctuary and natural waters.

Major Threats and Recommendations for Conservation

Presently, the flora and fauna of Indian national parks and sanctuaries are legally protected from human intervention. However, the boundaries of these areas are not large enough to encompass the entire ecosystem, and many stresses that affect the aquatic habitat originate beyond sanctuary boundaries. Until now, most water bodies within protected areas have been insufficiently recognized in India. The primary objective for successful conservation of the high fish diversity within the protected area network must be to develop effective controls and management practices that enable life cycle completion, dispersal and population maintenance within stream systems. Drastic ecological and anthropogenic changes of forest and aquatic habitat outside protected water bodies are great threats for fish biodiversity, as well as aquatic habitat. Spreading of fish diseases due to water pollution, over exploitation of fish fauna, use of poison, river alterations etc. are the main threats to fish fauna. Unless we take timely measures, these valuable resources will become endangered or extinct. Based on our observations, we recommend the following for management of fish biodiversity in a scientific manner.

1. The aquatic bodies within the Sanctuary should be declared as an aquatic sanctuary.
2. Afforestation programme should be intensified on the banks of water bodies.

Table 1: Fish diversity of Samaspur Bird Sanctuary, Rae Bareilly, Uttar Pradesh

Sl. No.	Scientific name	Family	Common name	IUCN status	Maximum total length (cm)
1.	*Chitala chitala* (Hamilton)	Notopteridae	Moye	EN	85.3
2.	*Notopterus notopterus* (Pallas)	Notopteridae	Patra	LRnt.	27.1
3.	*Gudusia chapra* (Hamilton-Buchanan)	Clupeidae	Suhia	LRlc.	22.5
4.	*Amblypharyngodon mola* (Hamilton-Buchanan)	Cyprinidae	Dhawai	LRlc.	18.2
5.	*Aristichthys nobilis* Richardson	Cyprinidae	Big-head	NE	45
6.	*Catla catla* (Hamilton-Buchanan)	Cyprinidae	Bhakur, Katla	VU	71
7.	*Cirrhinus mrigala* (Hamilton-Buchanan)	Cyprinidae	Nainee	LRnt.	66.5
8.	*Danio devario* (Hamilton-Buchanan)	Cyprinidae	Patukari	LRnt.	8.9
9.	*Labeo bata* (Hamilton-Buchanan)	Cyprinidae	Bata	LRnt.	38
10.	*Labeo calbasu* (Hamilton-Buchanan)	Cyprinidae	Kauranchi	LRnt.	57.3
11.	*Labeo gonius* (Hamilton-Buchanan)	Cyprinidae	Kursha	LRnt.	56
12.	*Labeo pangusia* (Hamilton-Buchanan)	Cyprinidae	Rewa	LRnt.	29.8
13.	*Labeo rohita* (Hamilton-Buchanan)	Cyprinidae	Rohu	LRnt.	75
14.	*Puntius chola* (Hamilton-Buchanan)	Cyprinidae	Puthi, Siddhari	NE	11.5
15.	*Puntius sarana* (Hamilton-Buchanan)	Cyprinidae	Puthi	VU	22.5
16.	*Puntius sophore* (Hamilton-Buchanan)	Cyprinidae	Pothi	LRnt.	12.5
17.	*Puntius ticto* (Hamilton-Buchanan)	Cyprinidae	Pothia	LRnt.	8.5
18.	*Salmostoma bacaila* (Hamilton-Buchanan)	Cyprinidae	Chelwa	LRlc.	10
19.	*Nemacheilus botia* (Hamilton-Buchanan)	Cyprinidae	Natwa	LRnt.	6.0
20.	*Aorichthys aor* (Hamilton-Buchanan)	Bagridae	Tengra	LRlc.	76
21.	*Mystus vittatus* (Bloch)	Bagridae	Tengra	VU	14.1
22.	*Rita rita* (Hamilton-Buchanan)	Bagridae	Hunna	LRnt.	40.7
23.	*Ompok pabda* (Hamilton-Buchanan)	Siluridae	Pabda	EN	15.5
24.	*Ompok pabo* (Hamilton-Buchanan)	Siluridae	Pabda	VU	14.4
25.	*Wallago attu* (Schneider)	Siluridae	Parhen, Barari	LRnt.	81.0
26.	*Ailia coila* (Hamilton-Buchanan)	Schilbeidae	Banspatti, Patasi	VU	13.2
27.	*Eutropiichthys vacha* (Hamilton-Buchanan)	Schilbeidae	Bachwa	EN	27.5
28.	*Clupisoma garua* (Hamilton-Buchanan)	Schilbeidae	Baikeri	VU	18.9
29.	*Clarias batrachus* (Linnaeus)	Clariidae	Magur	VU	29.7
30.	*Heteropneustes fossilis* (Bloch)	Heteropneustidae	Singee	VU	26.8
31.	*Xenentodon cancila* (Hamilton-Buchanan)	Belonidae	Kakhya, Thona	LRnt.	23.0
32.	*Monopterus* (*Amphipnous*) *cuchia* (Hamilton-Buchanan)	Synbranchidae	Cuchia	NE	45.6
33.	*Chanda nama* Hamilton-Buchanan	Ambassidae	Chanari	LRlc.	4.2
34.	*Parambassis ranga* (Hamilton-Buchanan)	Ambassidae	Chanari	LRlc.	5.3
35.	*Glossogobius guiris* (Hamilton-Buchanan)	Gobiidae	Bulla	LRnt.	6.3
36.	*Channa marulius* (Hamilton-Buchanan)	Channidae	Sauri	LRnt.	39
37.	*Channa orientalis* Bloch & Schneider	Channidae	Girohi	VU	12.2
38.	*Channa punctatus* (Bloch)	Channidae	Girohi	LRnt.	14.5
39.	*Channa striatus* (Bloch)	Channidae	Sauri	LRlc.	14.2
40.	*Macrognathus pancalus* Hamilton-Buchanan	Mastacembelidae	Basmi, Pataya	LRnt.	16.2
41.	*Mastacembelus armatus* (Lacepede)	Mastecembelidae	Baam.	LRlc.	56
42.	*Rhinomugil corsula* (Hamilton-Buchanan)	Mugilidae	Korsul, Answari	LRnt.	11.5
43.	*Nandus nandus* (Hamilton-Buchanan)	Nandidae	Vaadhul	LRnt.	14.8
44.	*Anabas testudineus* (Schneider)	Anabantidae	Kobai,	VU	15.1
45.	*Colisa fasciatus* (Schneider)	Belontiidae	Khosti	LRnt.	10.0
46.	*Colisa lalia* (Hamilton-Buchanan)	Belontidae	Khosti	LRnt.	4.7

* EN = Endangered; LRnt. = Lower Risk near threatened; LRlc. = Lower Risk least concern; VU = Vulnerable; NE = Not evaluated

3. Periodic monitoring of water quality parameters.
4. Existing suitable habitat should be protected from erosion and deterioration of water quality.
5. Maintain water depth; should not be less than 1-2 m.
6. Poisoning by villagers from the nearby villages should be stopped by regular monitoring.
7. Community awareness programme for increased participation in conservation.
8. Legislation should be implemented strictly for illegal activities.
9. Strengthening of manpower for scientific management of water bodies and fisheries.
10. Ranching programme can be undertaken for selective fishes, which are not abundant in the protected area.

There is need for more surveys so that more new records could be documented. The availability of fish species larger than that reported in literature, and occurrence of many threatened species in these protected water bodies, indicates the urgent need for developing a fresh water sanctuary, with scientific management.

ACKNOWLEDGEMENTS

We acknowledge Dr. R.L. Singh, Ex-Chief Conservator of Forest, Department of Forests & Wildlife, Uttar Pradesh for permission to carry out survey within the protected area. We thank Range Officer, Samaspur Bird Sanctuary, for his kind cooperation during the inventory.

REFERENCES

Anon (2004): National Bureau of Fish Genetic Resources (NBFGR), Indian Council of Agricultural Research (ICAR). Annual report, 2003-2004. 15 pp.

Arunachalam, M. & A. Sankaranarayanan (1999): Fishes of Gadana river in Kalakkad Mundanthurai Tiger Reserve. *J. Bombay Nat. Hist. Soc. 96(2)*: 232-238.

Biju, C.R., K. Raju Thomas & C.R. Ajithkumar (1999): Fishes of Parambikulam Wildlife Sanctuary, Palakkad district, Kerala. *J. Bombay Nat. Hist. Soc. 96(1)*: 82-87.

CAMP-NBFGR (1998): Freshwater Fishes of India. National Bureau Fish Genetic Resources, Lucknow, and Zoo Outreach Organization, Coimbatore. 327 pp.

Jayaram, K.C. (1999): The Freshwater Fishes of the Indian Region. Narendra Publishing House, Delhi. 551 pp.

Rodgers, W.A, H.S. Panwar & V.B. Mathur (2000): Wildlife Protected Area Network in India: A review. Wildlife Institute of India, Dehradun. 44 pp.

Sarkar, U.K., R.S. Negi, A.K. Pathak, S.K. Paul, V.S. Basheer & P.K. Deepak (2002): *Gudusia chapra* attains record size in water bodies of Samaspur Bird Sanctuary. *Fishing Chimes 22(6)*: 36-38.

Srivastava, G. (1988): Fishes of U.P. & Bihar. Vishwavidyalaya Prakashan, Varanasi. 207 pp.

Talwar, P.K. & A.G. Jhingran (1991): Inland Fishes of India and Adjacent Countries, Oxford & IBH, New Delhi. Vol. I & II. 1158 pp.

Wakid, A & S.P. Biwas (2003): Anthropogenic Pressure on the Aquatic Habitats: A case study in the Laika Forest Village of Dibru-Saikhowa National Park. Pp. 148-149. *In*: Participatory Approach for Fish Biodiversity Conservation in North East India (Eds: Mahanta P.C. & L.K. Tyagi). NBFGR, Lucknow.